(Pamphlet No. 56)

TANGANYIKA

DEPARTMENT OF AGRICULTURE

Seventeenth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi 1950

1953
PRINTED BY THE GOVERNMENT PRINTER
DAR ES SALAAM
Price Shs. 2/-

COMMONWEALTH MYCOLOGICAL INSTITUTE
1 JUL 1953

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NOTES

Coffea arabica only has been used in the experiments referred to in this Report.

All yields are calculated on the basis of hundredweights of clean coffee per acre.

References in the footnotes are to the pages on which full details, including results to date, of the particular experiment may be found.

A difference between any two treatments greater than the figure given as "Significant difference" is due to the particular treatment. The proof is not absolute, but, unless otherwise stated, the figure for significant difference is at the level of probability $P=0{\cdot}05$, which means that the chances against drawing a wrong conclusion by using the significant difference figure is nineteen to one. If the significant difference is based on $P=0{\cdot}01$, then the chances are ninety-nine to one against the conclusion being wrong.

Where no figure for significant difference is given, the differences that occur cannot be considered as being due to the particular treatment.

COFFEE RESEARCH AND EXPERIMENTAL STATION, LYAMUNGU, MOSHI

Report for the period 1st January to 31st December, 1950

General

No additional experiments were planted on the Station in 1950, the position being that all available land had been planted and the cleared areas on Lyamungu Coffee Estate (the extension to the Station) were not in a satisfactory condition; the removal of couch grass *(Digitaria scalarum)* and shade trees has caused a considerable disturbance of the soil and time is required to correct this.

The thirty-one acres of coffee on Lyamungu Coffee Estate which had been regenerated in the previous two years bore a crop of 10 cwt. of clean coffee per acre in the 1950 season.

As judged by the general heavy cropping in 1950 the comparatively low rainfall for the year 1949 had no adverse effect. During the period October—December, 1949, there were only two effective showers and neither brought a flowering. In January and February, 1950, sufficient rain fell to cause heavy flowerings and at the same time to produce a quantity of vegetative growth; this latter was maintained by very effective rain during most of March. The rains of April and May were heavy. Early in October a fall of 0·75 inches of rain followed by hot sun resulted in very rapid ripening; lack of rain in November necessitated stripping the remainder of the crop but the strippings only represented about two per cent of the crop.

The season's crop was equivalent to 59·5 tons clean coffee. The out-turn figure was 360 debes of cherry per ton of parchment; the more usual figure is 400. Seventy-three per cent of the crop, exclusive of floats and buni, attained Class 1, 2 or 3, 4,327 lb. were sold as seed to growers.

The percentage, by volume, of "lights" to cherry was 1·56 per cent.

A complete analysis of the season's crop is given on page 39.

Improvement of Planting Material

For a period of years from 1935 individual tree yields over some 20,000 trees were recorded. Analysis of these yields showed that, over the period, 70% of the crop had been borne by 30% of the trees and that within the 30% there were trees which had yielded at a mean annual rate equivalent to

13 cwt. of clean coffee per acre or more. All that was known of these trees was that they were capable of yielding at that rate : whether their superiority over the remaining 70% was due to an inherent capacity to yield or ability to respond to the particular conditions is not known. In other words it is not known whether all strains, (and for practical purpose and with our present knowledge it can be considered that the number of strains approaches the number of seedlings being grown) have the same inherent capacity to yield, environmental conditions only being the limiting factor.

Indications of the possible importance of the environmental factor on the yield of any one strain emerges from a study of the yield figures[1] of various strains being grown on the Station. The table below shows the degree of response, as judged by the yields of single plots, by each of four clones to the stated treatments of mulch and irrigation and a combination of these.

RESPONSES OF CLONES TO IRRIGATION AND MULCH (BANANA TRASH)

MEAN YIELD OF FOUR YEARS (1947-1950)

		Nil 00	Irrigation 10	Mulch 01	Irrigation and Mulch 11
KIL 50 ...	Cwt. per acre ...	5·34	10·25	10·69	13·22
	Response % over Nil	100·0	191·9	200·2	247·6
KIL 48 ...	Cwt. per acre ...	7·34	11·86	15·51	16·25
	Response % over Nil	100·0	161·6	211·3	221·4
KIL 98 ...	Cwt. per acre ...	8·87	13·37	13·69	16·11
	Response % over Nil	100·0	150·7	154·3	181·6
KIL 10 ...	Cwt. per acre ...	10·51	13·14	14·02	14·38
	Response % over Nil	100·0	125·0	133·4	136·8

From this it will be seen that the degree of response varies very considerably and that all the clones are capable, given the requisite conditions, of yielding at a rate over 13 cwt. of clean coffee per acre.

In Experiment I[2] eleven trees have been recorded for 13 seasons. Trees Nos. 55 and 71 have mean annual yields at the rate of 15·17 and 15·36 cwt. of clean coffee per acre respectively, yet there are considerable differences in yield between these two trees in many seasons. For example in 1939, 1941 and 1942 there were differences of 100%, 30% and 40% respectively. The overall response of these two trees to the conditions pertaining over

[1] Expt. XV Page 31. [2] Expt. I Page 28.

the thirteen years is the same but the response during portions of the period differs. A similar instance occurs in the Kents Plot[1] but the differences in yield in any one season are more marked. Trees Nos. 164 and 215 have a mean annual yield at the rate of 13·50 and 13·38 cwt. per acre, yet the yield in any one year may differ greatly. For example, in 1948 No. 164 yielded at the rate of 31 cwt. and No. 215 at only 4·78 cwt., No 215 bore at the rate of 30 cwt. per acre in 1939 however as compared with the 12 cwt. of Tree No. 164 in that year.

From the above it seems likely that, even within narrow limits of range of the factors which collectively constitute environmental conditions, the responses of the different strains of coffee may vary considerably. It might be that unsuitability to the particular conditions may have been the cause of the fact that of the 20,000 trees recorded, 70% were comparative failures; a large number of these, given the requisite conditions, might prove to be high yielders.

The work of selection of strains that, under particular conditions at any rate, yielded well, was soundly devised by my predecessor to cover the coffee grown under a variety of conditions and it forms a sound basis for the work of finding the most suitable types for each area in the coffee growing districts.

The overall high yields obtained at this Station over the last five years may be due to the large number of selected strains which have been planted, some of which in each season have responded in high degree to the particular environmental conditions. For example in Experiment XVIII[2] Latin Square VIII—H 66 in 1948 bore a crop equivalent to 7·7 cwt. of clean coffee per acre whilst the other trees in that square yielded at the rate of 3·3 cwt. or less; in the previous season it had yielded at the rate of one ton per acre.

The recording of the progeny plots, both clonal and seedling, of the selections, and of individual trees considered as possible selections, was continued in the 1950 season. The figures relating to these are given on pages 10-28.

In the clonal selection trials (Experiment XVIII) there are some outstanding trees. KP 423 (L.S. III) on multiple stem has, for its first four bearing years, yielded at the rate of 15·15 cwt. of clean coffee per acre. H 66 (L.S. VIII) on single stem, over six bearing years, has yielded at the rate of 11·13 cwt. and N 197 in L.S. X, 11·93 cwt.; both of these latter are grown on the single stem system. In Kents Plot[3] the mother tree KP 423 has, over thirteen years, a mean annual yield at the rate of 14 cwt. of clean coffee per acre and there are several which have a mean annual yield of 13 cwt. In Experiment I[4]—Tree No. 33 has a mean annual yield of 17·52 cwt. and four more have exceeded 15 cwt.

[1] Kents Plot Selections Page 27. [2] Expt. XVIII Page 10. [3] Page 27. [4] Page 28.

for a thirteen-year period. Within the seedling progeny plots of H 61[1] a tree has been found which, over the last three years; has a mean annual yield at the rate of 25·9 cwt. per acre, the yields for the individual years being at the rate of 31·6 cwt., 9·2 cwt. and 36·9 cwt. per acre. Another tree from the same plots has averaged at the rate of 23·3 cwt. per acre for the same period, yet the mean yield for all the plots of the seedling progeny of H 61 is at the rate of 11·31 cwt. per acre for the same three years.

In the experiment (III A)[2] where the yields of clones and seedlings of the same mother trees are being compared, the summary of results for six years shows that there is no significant difference in yields. In another experiment (III)[3] where a similar comparison is possible and in which yields have been recorded from the tenth to twelfth year from planting out, a significant difference in favour of seedlings is shown. (Differences in bean characters are discussed on page 6).

Up to the 1950 season Experiment IIIA had been recorded by plots, but in 1950 individual tree yields were recorded. The yields show a coefficient of variation of 63·32% and 58·28% for clones and seedlings respectively, i.e., the variation in yield from tree to tree was slightly greater in clones than in seedlings in the 1950 season.

A similar figure for Experiment III[3] for three years shows the coefficient of variation to be 35·39% in the case of seedlings and 39·25% for clones. It seems therefore that the tree to tree variation is of the same order for both clones and seedlings of the same parent trees.

Improvement of Growing Conditions

When the experiments designed to effect improvement (as judged by yields) in growing conditions were inititated there was no information at all as to what treatment would be effective; consequently these experiments had to cover as large a number of treatments and at as many levels as possible. The work of selecting desirable types within the C. arabica population was in its early stages, and the degree of variability of seedlings from even one parent was unknown. In these circumstances, and in order to gain knowledge of the treatments likely to effect increase in yield, clonal material of parents of unknown yield capacity was used in some of the experiments, the assumption being made that the material used was representative in some degree of the general coffee population. Now that some beneficial treatments have been determined and also that some strains may respond more than others to various treatments, it will be possible to determine which of the selections, as they are proved for these conditions, will give the highest economic return under one or more of these treatments. Degree of response is not the important point; it is the greatest economic return which matters.

[1] Expt. II Selections Page 18. [2] Expt. IIIA Page 29. [3] Expt. III Page 29.

The results, so far, of these experiments designed to effect improvement in growing conditions show that the following treatments have been effective in increasing yields.—

*1. Banana trash as mulch at 40 lb. per tree.
2. Irrigation to the extent of making up the rainfall to 2″ monthly.
3. A combination of (1) and (2).
†4. Compost at one debe per tree.
‡5. Pruning on the multiple stem system as compared with single stem system.

In the experiment§ in which various methods of cultivation have been applied over a period of thirteen years, no conclusive result has been obtained but the results suggest that cultivation with the fork jembe is the best.

Sulphate of ammonia† at three ounces per tree and elephant grass (as mulch) have increased yields when applied singly but the increases are not significant; the depressing effect on yield of combinations of these two treatments and the depressing effect of sulphate of ammonia when applied with compost may, due to the design of the particular experiment, have masked the real effect of the single treatments of sulphate of ammonia and elephant grass.

The results also show that heavier applications of banana trash and irrigation than those given in (1) and (2) above produce no further increase in yield.

Irrigation, either with or without mulch (banana trash) counteracted the tendency towards biennial bearing in the seasons 1947, 1948 and 1949 and maintained a high level of cropping. The yields, in the 1950 season, of the plots receiving this treatment were only about half of the average yield for the three previous seasons. The nil treatment plots in the same experiment were in their "on" year, so climatic conditions as such cannot be considered to have been the limiting factor. It can only be assumed that the irrigation treatments, either with or without mulch, failed to maintain the nutritional status of the trees at a sufficiently high level to allow of flower bud formation sufficient to produce a large crop for the fourth consecutive season. Even with this falling off in crop in the fourth year the degree of intensity of biennial bearing is very much less than with coffee receiving mulch or no treatment at all.

Not the least important of the information obtained from the experiments designed to improve growing conditions is the indication that different clones may respond in differing degrees to the same treatment.

*Expt. XV Page 31. †Expt. V Page 30. ‡Expt. XIII Page 37. §Expt. IX Page 35.

Bean Measurements

In the last report the conclusion drawn from measurements of the physical characters of bulk samples of beans from clones and seedlings in Experiment III and IIIA was to the effect that no real differences occurred. It has now been possible to compare samples of beans produced in the 1950 season from clones and seedlings of each of the parent trees represented in Experiment IIIA. The results tabulated below are obtained from random samples of twenty-five beans with forty replications.

	Weight	Volume	Specific Gravity
N 20	Sxxx	Sxxx	—
N 100	Sxx	Sxx	—
N 5	Sxx	Sxx	—
M 7	—	—	—
R 3	Cxx	Cxx	—
M 95	—	—	—
N 29	Sxxx	Sxxx	—
R 23	—	—	Sx
I 49	Sxxx	Sxxx	—

xxx = Significant at P = 0·001.
xx = Significant at P = 0·01.
x = Significant at P = 0·05.
S = In favour of seedlings.
C = In favour of clones.

It will be seen that in respect of weight and volume the differences vary from Nil in the case of M7 and R23 to significance at P = 0·001 in favour of seedlings in the cases of N20, I49 and N29. The differences are in favour of clones in the case of R3 at P = 0·01. It is of interest to note that the density of beans from clones and seedlings of the same parent tree is the same although there are differences in volume and weight. The exception (R23) which shows the density to be in favour of seedlings at P = 0·05 can reasonably be ignored as being due to error, particularly since no difference occurred in either weight or volume.

A comparison of the densities of the beans from the progeny of the nine parent trees in Experiment IIIA shows that significant differences in this respect occur even when produced under uniform conditions—it has previously been shown that this was so in the case of trees growing under widely differing conditions.

The fact that the density of beans produced by the seedling and clonal progeny of any one of these parent trees remains constant suggests the possibility that density is a genetic factor. Further evidence supporting this is available from comparisons of beans produced by the same clone grown under differing conditions, (N 39 on Experiments IV and XVIII in 1949) and also from the four clones in Experiment XV where a comparison of the densities of beans produced by each clone under the Nil treatment, the lowest level of irrigation and the lowest level of mulch, show no differences except in the case of KIL 98 and this at the P = 0·05 level only. There is

also no significant difference in density between beans of the same clone under the irrigation treatment as compared with those produced under the mulch treatment.

Over a six-year period a study of the effect of yield on average bean weight shows that there is a positive correlation between these two factors. It has been established previously also that weight and volume of bean are positively correlated; therefore it follows that in years of heavy crop the beans produced are larger than those produced in a poor cropping season. This confirms the view generally held by growers. An example of this on a commercial scale may be taken from the coffee produced by the station in the 1946/47 and 1947/48 seasons in which the crops were at the rate of one hundredweight and 10 cwt. per acre respectively and the percentage of "A" grade was twenty-seven and sixty-three respectively.

Over a six-year period mulching with banana trash, although showing a tendency to increase average bean weight, does not effect a significant increase in this respect but irrigation does so.

The out-turn figure (clean coffee to cherry) is depressed by mulch treatments on irrigated and non-irrigated plots, but since mulch increases yields and bean weight is positively correlated with yield, it appears that mulch has increased the 'pulp' disproportionately to the increase in bean weight. Irrigation appears to have no effect on out-turn figures either in mulched or non-mulched plots.

Vegetative Propagation

During the year work was confined to the mass production of rooted cuttings. The taking and setting of cuttings commenced in March and the improved technique, resulting from the experiments described in the Annual Reports of 1948 and 1949, gave very satisfactory results. In 1950 81·59% of the cuttings set in the frames rooted within six months and of these only 8·32% failed to survive; i.e. 78% of the total cuttings planted, rooted and reached the planting out stage.

An analysis showing numbers of cuttings rooted and rate of rooting is shown on page 39.

Liquoring

Samples of 'A' grade from the various plots in the experiments were submitted for liquoring qualities. There is no evidence that any treatment applied in the field affects the liquoring standard.

Samples hulled during April and May, months in which the atmospheric humidity is extremely high, were reported on as being "woody" even after only ten days had elapsed after hulling.

Miscellaneous Experiments

In an experiment, under ordinary nursery conditions, in which the effect of age (from harvesting) at the time of sowing on percentage germination and time taken to germinate was being investigated, it has been found that after storage for a period of 21 weeks[1] from harvesting the percentage germination fell appreciably and that after 30 weeks storage there is a further fall in viability. With an increase in the age of the seed the time taken to germinate also increases, 7 weeks old seed gave 95% germination in 10·1 weeks, 16 weeks old seed germinated to the same extent but in 11·6 weeks and 25 weeks old seed showed only 60% germination in 23·1 weeks.

It is interesting to note that seed which was pulped, fermented and washed before being shade dried, gave very similar results to that prepared in the normal manner, i.e. pulped and dried in wood ash without the fermentation process.

Pests and Diseases

The incidence of *Pseudococcus filamentosus* during the period April to August was heavy and again caused damage to growing points, particularly in multiple stem coffee. As in previous years by September it had practically disappeared.

The number of trees affected by white stem borer (*Anthores leuconotus*) continued to increase.

Pre-monsoon spraying with 1% Bordeaux mixture to control *Hemileia vastatrix* was carried out. In July a further spraying was done but at ½% strength. D.D.T. was applied with the pre-monsoon Bordeaux spraying in order to control *Antestia lineaticollis*. The incidence of this pest in July was virtually nil and therefore D.D.T. was not applied with the post-monsoon Bordeaux spray.

Trials of Clonal Material in the Districts

Six additional trials were planted.

Mbosi Sub-Station

Investigational work on the cause of "black" or "wither" tip of coffee in the Mbosi area was continued. Originally it was considered that Boron deficiency might be the cause but the injection and spraying of affected trees with Boron compounds failed to prevent the occurrence. The possibility of the deficiency of other minor elements being the cause is being investigated by the Government Chemist.

The field experiments described in the last report have been maintained.

1 Age of seed Expt. Page 39.

Animal Husbandry

Thirty-nine calves were born during the year, twenty-one being heifers.

The total milk production amounted to 6,035 gallons from forty-three cows.

All cows and their progeny that had not produced 200 gallons in any one lactation were culled during the year. The progeny of the Sahiwal-Boran cross bull are doing well, three out of thirteen yielded over 300 gallons in their first lactation, of the remainder only four failed to reach 200 gallons in their first lactation.

There were two cases of 'fly' both of which recovered. One cow was lost from milk fever.

Visitors

Visitors included the Honourable the Director of Agriculture, Members of the Brazilian Mission, the Director of the Commonwealth Bureau of Horticulture and Plantation Crops, East Malling, Kent, Mr. Gorell Barnes and Mr. B. G. Surridge of the Colonial Office, Mr. Cormack of the Department of Agriculture, Nyasaland and Dr. Norman Wright, Chairman Designate of the Colonial Research Council.

The Tanganyika Coffee Growers' Association arranged a Planters' Day on February 16th. Parties of growers from various parts of the Territory were conducted round the Station on various occasions as were parties from some of the schools in the district.

I wish to record my thanks to Mr. C. R. Devonshire, Liquorer to the Kenya Coffee Marketing Board and to Mr. W. R. Forder, Liquorer of the Tanganyika Coffee Board, for liquoring the many coffee samples sent to them, and also to Mr. P. Robinson, Statistician, East African Agriculture and Forestry Research Organisation, for his advice on the analysis of various experiments.

I wish also to express my appreciation of the work done by the Staff of this Station.

Coffee Research Station,

November, 1951

F. R. Sanders,
Senior Research Officer

Experiment XVIII.—Clonal Selection Trials

These trials consist of a series of 6x6 latin squares, wherein the yields of rooted cuttings of potential selections are compared. Planting commenced in April 1943; additional squares have been planted up subsequently, as material became available. By the end of 1950, sixteen squares had been planted, of which fourteen were in bearing. All squares planted prior to April 1944 (eight in number) have been pruned on the single stem system; those planted subsequently have been grown on multiple stem. Each square is planted with the following shade trees, so that each of the six plots of any one clone has a different semi-permanent shade tree.

Semi-permanent:—

Albizzia moluccana
Albizzia stipulata
Albizzia sp. ("Tangasale")
Cordia holstii
Ficus sycamorus
Maesopsis eminii

Permanent:—

Albizzia Maranguensis

Yearly yields and mean yields for each square are given below, the calculated yields of the original parents being included for reference. Except where otherwise indicated, the yields, expressed as cwts. of clean coffee per acre, have been calculated on a sixteen per cent out-turn basis.

Latin Square I.—Planted 29th April, 1943—Single Stem

Parent									Mean of 6 years 1945-50	
Mean Yield	No. of years recorded	Clone	1945	1946	1947	*1948	*1949	*1950		
									Cwt.	Percentages
16·83 ...	7	N 39	4·84	1·30	13·61*	2·46	11·49	15·53	8·20	98·8
10·17 ...	7	R 23	1·29	1·44	12·32	0·52	16·94	10·40	7·15	86·1
13·59 ...	7	N 71	1·37	2·18	12·09	1·12	16·36	12·73	7·64	92·1
32·48 ...	1	I 60	2·04	3·52	14·98	1·10	16·45	18·51	9·43	113·7
6·69 ...	4	M 2	1·90	3·37	12·07	1·97	15·02	15·42	8·29	99·9
11·44 ...	8	L 1	2·33	2·04	14·45	1·23	18·12	16·33	9·08	109·5
Mean			2·29	2·31	13·25	1·40	15·73	14·82	8·30	100·0
Standard Error			0·26	0·45	–	0·32	0·82	1·59	0·23	2·8
Significant Difference (P = ·05) ...			0·76	1·32	–	0·94	2·42	4·70	0·68	8·2

*Using actual out-turn.

Latin Square II.—Planted 30th April, 1943—Single Stem

Parent		Clone	1945	1946	1947	*1948	*1949	*1950	Mean of 6 years 1945-50	
Mean Yield	No. of years recorded								Cwt.	Percentages
17·12	7	N 20	1·44	2·22	10·54	1·25	13·25	14·85	7·28	93·5
12·54	7	N 30	2·98	0·95	10·54	0·86	12·61	11·84	6·63	85·2
14·39	7	N 29	3·03	2·43	12·31	1·59	13·71	12·93	7·67	98·4
14·55	7	N 5	5·29	0·93	12·92*	1·06	10·92	12·76	7·31	93·9
32·04	1	N 48	2·06	2·43	10·81	0·73	15·20	16·04	7·88	101·2
13·88	7	N 197	4·17	5·33	14·07*	1·60	15·92	18·58	9·94	127·7
Mean			3·17	2·39	11·87	1·18	13·60	14·50	7·79	100·0
Standard Error			0·33	0·46	–	0·18	0·81	1·43	0·32	4·1
Significant Difference (P = ·05)			1·39	1·35	–	0·53	2·38	4·22	0·94	12·1

*Using actual out-turn.

Latin Square III.—Planted 26th October, 1944—Multiple Stem

Parent		Clone	1947	*1948	*1949	*1950	Mean of 4 years 1947-50	
Mean Yield	No. of years recorded						Cwt.	Percentages
14·55	7	N 5	*6·26	11·42	14·39	11·88	10·99	98·2
13·77	6	AB 35	4·56	11·60	11·63	13·79	10·40	92·9
11·49	12	KP 154	3·25	13·40	15·33	19·98	12·99	116·0
14·78	12	KP 423	6·82	13·48	14·11	26·18	15·15	135·3
5·04	4	M 97	5·51	10·51	10·99	9·29	9·07	81·1
12·13	7	N 106	5·79	8·10	10·24	10·12	8·56	76·5
Mean			5·37	11·42	12·78	15·20	11·19	100·0
Standard Error			–	0·62	0·93	1·36	0·43	3·8
Significant Difference (P = ·05)			–	1·84	2·73	4·01	1·26	11·2

*Using actual out-turn.

Latin Square VII.—Planted 7th June, 1943—Single Stem

Parent		Clone	1945	1946	1947	*1948	*1949	*1950	Mean of 6 years 1945-50	
Mean Yield	No. of years recorded								Cwt.	Percentages
13·87 ...	7	R 15	3·63	2·50	*13·13	0·94	17·81	15·86	8·98	105·6
11·23 ...	7	N 81	3·76	3·65	15·43	2·92	16·39	14·04	9·36	110·2
9·60 ...	12	KP 228	2·80	2·80	14·62	5·79	14·37	18·06	9·74	114·6
10·45 ...	7	I 49	2·14	1·43	10·78	1·24	14·75	18·76	8·18	96·3
3·75 ...	3	S 16	2·32	0·95	10·43	1·18	11·33	12·09	6·38	75·1
15·19 ...	7	N 34	1·68	1·90	10·57	1·28	17·57	17·07	8·34	98·2
Mean			2·73	2·21	12·49	2·23	15·37	15·99	8·50	100·0
Standard Error			0·44	0·38	–	0·42	0·78	1·61	0·43	5·0
Significant Difference (P = ·05) ...			1·30	1·12	–	1·25	2·30	–	1·26	14·8

*Using actual out-turn.

Latin Square VIII.—Planted 13th August, 1943—Single Stem

Parent		Clone	1945	1946	1947	*1948	*1949	*1950	Mean of 6 years 1945-50	
Mean Yield	No. of years recorded								Cwt.	Percentages
14·02 ...	7	R 2	2·38	4·55	13·75	1·28	19·36	9·71	8·50	94·4
11·27 ...	4	H 66	2·58	3·47	*20·28	7·72	14·55	18·18	11·13	123·6
6·14 ...	4	M 7	1·46	3·48	11·24	1·96	17·22	12·32	7·95	88·3
11·95 ...	6	AB 92	0·95	3·20	11·43	2·36	16·16	15·32	8·23	91·5
15·04 ...	7	N 218	2·23	2·25	14·62	3·26	16·17	13·57	8·76	97·3
13·58 ...	7	N 100	2·22	4·65	*14·30	1·77	20·09	13·65	9·44	104·9
Mean			1·97	3·59	14·27	3·06	17·34	13·79	9·00	100·0
Standard Error			0·35	0·47	–	0·68	1·20	1·20	0·34	3·7
Significant Difference (P = ·05) ...			1·02	1·38	–	2·00	2·54	3·54	0·99	11·0

*Using actual out-turn.

Latin Square IX.—Planted 20th December, 1943—Single Stem

Parent		Clone	1946	1947	*1948	*1949	*1950	Mean of 5 years 1946-50	
Mean Yield	No. of years recorded							Cwt.	Percentages
10·49 ...	6	AC 98	4·07	9·54	4·24	14·07	11·42	7·23	97·2
18·38 ...	7	R 3	5·22	10·12	1·70	18·43	6·54	7·00	94·1
10·62 ...	12	KP 683	4·46	13·63	4·78	14·54	8·33	7·62	102·4
14·07 ...	7	N 205	6·60	13·02	3·10	18·30	10·73	8·63	116·0
10·94 ...	7	N 128	4·87	12·91	1·75	17·37	5·02	6·98	93·8
11·29 ...	7	I 5	4·58	10·39	2·87	17·52	7·83	7·20	96·8
Mean		... ...	4·96	11·60	3·07	16·71	8·31	7·44	100·0
Standard Error ...		... ...	–	–	0·51	1·36	1·26	0·36	4·8
Significant Difference (P = ·05)		... ...	–	–	1·49	–	3·72	1·05	14·1

*Using actual out-turn.

Latin Square X—Planted 29th December, 1943—Single Stem

Parent		Clone	1946	1947	*1948	*1949	*1950	Mean of 5 years 1946-50	
Mean Yield	No. of years recorded							Cwt.	Percentages
36·90 ...	1	N 110	4·79	12·99	3·02	11·45	11·03	8·46	84·4
7·37 ...	3	M 95	4·13	11·16	0·93	13·22	13·25	8·38	83·6
11·28 ...	12	KP 532	5·36	16·03	8·32	14·84	15·50	12·30	122·8
13·88 ...	7	N 197	9·50	*13·70	3·13	17·31	16·02	11·93	119·1
11·98 ...	7	I 235	5·15	12·05	2·38	15·73	15·55	9·99	99·7
11·71 ...	7	R 11	5·18	11·14	1·62	16·45	11·97	9·06	90·4
Mean		... ...	5·69	12·85	3·24	14·83	13·89	10·02	100·0
Standard Error ...		... ...	–	–	0·64	0·85	1·63	0·37	3·7
Significant Difference (P = ·05)		... ...	–	–	1·90	2·50	–	1·10	11·0

*Using actual out-turn.

Latin Square XI.—Planted 16th April, 1946—Multiple Stem

Parent Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	Mean of 3 years 1948-50	
						Cwt.	Percentages
9·22	11	KI 363	3·01	16·34	13·92	11·09	112·4
13·88	7	N 197	1·18	10·91	14·93	9·01	91·3
13·58	7	N 100	1·80	12·88	17·65	10·78	109·2
18·38	7	R 3	1·20	10·68	12·21	8·03	81·4
14·55	7	N 5	1·67	18·14	12·99	10·93	110·7
16·83	7	N 39	1·08	14·56	12·53	9·39	95·1
Mean			1·66	13·91	14·04	9·87	100·0
Standard Error			0·21	0·91	1·18	0·52	5·3
Significant Difference (P = ·05)			0·61	2·69	3·48	1·54	15·6

*Using actual out-turn.

Latin Square XII.—Planted 16th April, 1946—Multiple Stem

Parent Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	Mean of 3 years 1948-50	
						Cwt.	Percentages
10·81	12	KP 227	3·16	17·89	18·65	13·23	114·4
11·81	7	N 181	3·50	17·94	11·20	10·90	94·3
13·58	7	N 100	3·29	13·93	16·20	11·14	96·4
10·03	7	R 24	1·76	11·99	16·40	10·07	87·1
13·11	12	KP 231	0·89	12·41	19·24	10·85	93·9
12·55	12	KP 163	3·32	18·53	17·77	13·21	114·3
Mean			2·65	15·45	16·57	11·56	100·0
Standard Error			0·55	1·15	1·15	0·78	6·75
Significant Difference (P = ·05)			1·62	3·39	3·38	0·23	1·99

*Using actual out-turn.

Latin Square XIII.—Planted 26th April, 1946—Multiple Stem

Parent						Mean of 3 years 1948-50	
Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950		
						Cwt.	Percentages
11·27	5	X 321	2·71	13·69	17·86	11·42	117·9
10·76	6	AC 189	3·49	7·71	13·12	8·11	83·7
13·58	7	N 100	0·79	8·60	19·21	9·53	98·3
Mean			2·33	10·00	16·73	9·69	100·0
Standard Error			0·72	0·84	2·10	0·73	7·5
Significant Difference (P = ·05)			–	3·05	2·28	–	–

*Using actual out-turn.

Latin Square XIV.—Planted 21st May, 1947—Multiple Stem

Parent					Mean of 2 years 1949-50	
Mean Yield	No. of years recorded	Clone	*1949	*1950		
					Cwt.	Percentages
18·38	7	R 3	0·38	6·56	3·47	92·1
15·20	7	N 50	0·57	6·44	3·51	93·0
15·87	4	H 1	0·49	5·92	3·20	85·0
10·59	6	AC 53	0·42	8·52	4·47	118·6
36·90	1	N 110	0·58	8·59	4·59	121·6
Unknown		KIL 10	0·46	6·31	3·39	89·8
Mean			0·49	7·06	3·77	100·0
Standard Error			0·13	0·92	0·47	12·5
Significant Difference (P = ·05)			–	–	–	–

*Using actual out-turn.

Latin Square XV.—Planted 26th January, 1944—Single Stem

Parent		Clone	1946	1947	*1948	*1949	*1950	Mean of 5 years 1946-50	
Mean Yield	No. of years recorded							Cwt.	Percentages
11·95 ...	6	AB 11	1·63	12·63	2·61	11·99	9·55	7·68	109·2
15·20 ...	7	N 50	0·82	9·82	1·72	13·88	7·34	6·72	95·6
11·44 ...	8	L 1	1·17	13·66	2·74	13·52	6·69	7·55	107·4
9·32 ...	12	KP 263	1·54	9·62	6·38	8·29	11·60	7·49	106·5
11·83 ...	7	I 47	1·23	10·73	2·23	12·31	5·88	6·47	92·0
14·08 ...	7	N 215	1·95	9·97	1·79	11·91	5·81	6·28	89·3
Mean		... ...	1·39	11·07	2·91	11·99	7·81	7·03	100·0
Standard Error ...		... ...	–	–	0·61	1·00	1·00	0·35	5·0
Significant Difference		... ...	–	–	1·79	2·94	2·96	1·03	14·7

*Using actual out-turn.

Latin Square XVI.—Planted 3rd March, 1944—Single Stem

Parent		Clone	1946	1947	*1948	*1949	*1950	Mean of 5 years 1946-50	
Mean Yield	No. of years recorded							Cwt.	Percentages
11·27 ...	7	N 198	0·72	7·93	2·67	13·30	11·44	7·21	96·4
18·38 ...	7	R 3	0·66	7·88	0·87	13·23	10·90	6·71	89·7
8·38 ...	7	R 25	0·66	7·04	2·01	11·49	9·96	6·23	83·3
12·63 ...	7	N 76	0·83	8·83	3·89	13·77	14·09	8·28	110·7
13·31 ...	7	N 220	0·86	4·85	2·87	10·52	9·88	5·80	77·5
13·88 ...	7	N 197	1·33	*9·29	5·34	17·66	19·68	10·66	142·5
Mean		... ...	0·85	7·64	2·94	13·23	12·66	7·48	100·0
Standard Error ...		... ...	–	–	0·60	0·70	0·87	0·28	3·7
Significant Difference (P = ·05)		... ...	–	–	1·78	2·08	2·57	0·82	10·9

*Using actual out-turn.

Latin Square XVII.—Planted 13th September, 1945—Multiple Stem

Parent Mean Yield	No. of years recorded	Clone	*1948	*1949	*1950	Mean of 3 years 1948-50	
						Cwt.	Percentages
6·74	12	KP 162	6·76	17·91	24·94	16·54	142·8
15·19	7	N 34	7·20	15·79	19·37	14·12	121·9
14·71	7	N 14	1·90	8·89	11·44	7·41	64·0
12·66	7	I 56	4·84	11·81	15·35	10·66	92·1
18·38	7	R 3	4·99	11·86	12·89	9·92	85·7
7·13	7	F 502	6·05	9·94	16·54	10·84	93·6
Mean		... ...	5·29	12·70	16·75	11·58	100·0
Standard Error		... ...	0·91	1·05	1·09	0·76	6·6
Significant Difference (P = ·05)		... ...	2·67	3·10	3·33	2·24	19·3

*Using actual out-turn.

EXPERIMENT IV.—Squares II, V and IX—Clonal Selection Trials

The three original squares in Experiment IV were uprooted, because of the unsuitability of the various exotic coffees planted therein. As material became available, they were each replanted with the same five clones, Squares II and V being grown on the single stem system and Square IX on multiple stem. The spacing is 8 ft. x 8 ft. apart.

The results have been disappointing, probably due to the heavy shade, prior to 1948, of *Acrocarpus fraxinifolius*, *Cordia holstii*, and *Albizzia maranguensis*, and the previous existence of coffee in the area. However, the yields in 1949 and 1950 showed considerable improvement.

Latin Square V.—Planted 9th April, 1942—Single Stem

Parent Mean Yield	No. of years recorded	Clone	1945	1946	1947	*1948	*1949	*1950	Mean of 6 years 1945-50	
									Cwt.	Percentages
16·83 ...	7	N 39	2·47	Crop failed	3·28	5·76	4·82	21·78	6·28	94·6
18·38 ...	7	R 3	4·37		8·52	0·88	10·30	12·45	5·89	88·7
11·44 ...	8	L 1	3·86		9·58	1·51	11·12	16·78	6·92	104·2
13·58 ...	7	N 100	2·97		9·74	0·93	11·66	14·98	6·48	97·6
13·88 ...	7	N 197	4·23		10·09	2·65	11·27	18·84	7·62	114·8
Mean			3·58		8·24	2·35	9·83	16·97	6·64	100·0
Standard Error			0·33		–	0·459	0·94	1·21	0·31	4·7
Significant Difference (P = ·05) ...			1·02		–	1·415	2·91	3·72	0·95	14·3

*Using actual out-turn.

Latin Square II.—Planted 13th April, 1943—Single Stem

Parent		Clone	1945	1946	1947	*1948	*1949	*1950	Mean of 6 years 1945-50	
Mean Yield	No. of years recorded								Cwt.	Percentages
16·83 ...	7	N 39	1·11	Crop failed	4·84	2·34	5·63	16·41	4·94	91·8
18·38 ...	7	R 3	1·31		6·56	0·38	9·70	10·13	4·52	84·0
11·44 ...	8	L 1	1·40		8·21	1·51	12·52	14·78	6·20	115·2
13·58 ...	7	N 100	1·19		7·64	1·01	9·90	12·88	5·25	97·6
13·88 ...	7	N 197	1·64		8·08	1·48	10·23	15·60	5·98	111·2
Mean			1·33		7·07	1·34	9·60	13·96	5·38	100·0
Standard Error			0·15		–	0·351	0·64	0·94	0·18	3·3
Significant Difference (P = ·05) ...			0·45		–	1·083	1·98	2·90	0·56	10·4

*Using actual out-turn.

Latin Square IX.—Planted 17th March, 1944—Multiple Stem

Parent			Clone	*1948	*1949	*1950	Mean of 3 years 1948-50	
Mean Yield		No. of years recorded					Cwt.	Percentages
16·83		7	N 39	2·19	11·30	4·05	5·85	97·8
18·38		7	R 3	2·34	7·18	6·22	5·25	87·8
11·44		8	L 1	1·94	7·09	7·71	5·58	93·3
13·58		7	N 100	2·61	9·30	7·03	6·31	105·5
13·88		7	N 197	2·86	10·08	7·78	6·90	115·4
Mean	... ...		... ...	2·39	8·99	6·55	5·98	100·0
Standard Error ...	... ...		... ...	0·440	1·06	0·65	0·46	7·6
Significant Difference (P = ·05) ...	... ...		... ...	–	–	1·99	–	–

*Using actual out-turn.

EXPERIMENT II.—Seedling Selection Trials

These trials are laid out in the form of four 6x6 latin squares, and two randomized blocks, each with nine selections repeated six times. The object of the experiment is to compare the yields of seedling progeny of potential selections under the conditions existing at this station. The area has high light shade of *Albizzia maranguensis*, *Cordia Holstii*, and *Leucaena glauca*.

The yearly yields, and means over the bearing period, are given below and are expressed as cwts. of clean coffee per acre. The calculated yields of the parent trees, from which the original seed was obtained, are also given as a matter of interest, together with the number of years for which each tree was recorded. No direct comparison between these latter is possible, however, except where they bear the same initial letter, since they originate from estates often in widely differing districts.

Latin Square I.—Planted May, 1938—Single Stem

Summary of Results for 1941-1950

Parent		Selection	1941	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 10 years 1941—1950	
Mean Yield	No. of years recorded												Cwt.	Percentage
7·13	7	F 502	1·32	2·65	6·82	8·42	3·94	5·02	16·32	4·14	14·00	6·35	6·90	126·1
15·00	5	P 280	1·21	4·35	7·01	7·87	2·55	4·85	13·84	1·80	12·15	5·48	6·11	117·7
11·88	5	P 313	0·95	4·60	6·17	8·30	2·57	4·45	13·78	4·37	12·12	6·63	6·40	117·0
12·32	5	P 348	0·84	2·07	4·43	6·38	1·19	5·31	9·75	4·63	9·42	5·05	4·90	89·6
13·17	5	P 147	0·73	1·57	3·82	5·96	1·54	4·20	10·09	4·88	8·99	6·32	4·81	87·9
13·34	5	P 190	0·77	1·29	1·53	3·69	0·87	3·63	6·56	6·78	6·22	5·87	3·72	68·0
Mean		... ...	0·97	2·76	4·96	6·77	2·10	4·58	11·72	4·43	10·50	5·95	5·47	100·0
Standard error ...		... ...	—	0·29	0·33	0·42	0·38	0·51	0·73	0·70	1·06	0·60	0·24	4·4
Significant difference ...		... ...	—	1·55	0·96	1·24	1·12	—	2·17	2·06	3·11	—	0·72	13·2
			—	(P=·001)	(P=·05)	(P=·05)	(P=·05)	(P=·05)	(P=·05)	(P=·05)	(P=·05)	—	(P=·05)	—

*Using actual out-turn.

Latin Square II.—Planted October, 1938—Single Stem

Summary of Results for 1942-1950

Parent		Selections	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 9 years 1942—1950	
Mean Yield	No. of years recorded											Cwt.	Percentage
15·04	4	H 133	1·56	4·67	4·57	1·45	3·18	13·37	1·98	12·11	9·07	5·75	102·7
11·44	8	L 1	1·13	4·86	4·42	2·05	3·52	14·42	4·45	12·92	9·87	6·41	114·5
9·39	7	F 839	1·11	4·78	5·39	3·91	2·38	15·38	3·70	13·03	8·00	6·41	114·5
16·83	7	N 39	0·93	3·09	3·35	3·46	3·04	12·86	6·48	7·99	12·48	5·96	106·4
13·17	5	P 147	0·76	2·78	4·28	0·88	3·29	10·17	5·02	9·21	7·21	4·84	86·4
7·50	7	E 59	0·69	2·04	3·94	0·88	3·20	8·62	5·74	7·04	5·88	4·23	75·5
Mean			1·03	3·71	4·29	2·10	3·10	12·47	4·56	10·38	8·75	5·60	100·0
Standard error			0·27	0·37	0·24	0·33	0·44	0·69	0·73	0·65	0·67	0·21	3·8
Significant difference (P=·05)			—	1·08	0·70	0·99	—	2·02	2·22	1·91	1·98	0·61	10·9

*Using actual out-turn.

Latin Square III.—Planted October, 1938—Single Stem

Summary of Results for 1942-1950

Parent		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 9 years 1942—1950	
Mean Yield	No. of years recorded											Cwt.	Percentage
15·07	4	H 1	1·34	4·85	8·36	3·64	1·82	15·78	7·55	14·67	11·10	7·67	125·4
8·76	7	F 840	0·90	4·57	7·87	3·65	3·44	15·96	4·33	14·80	10·33	7·31	119·4
11·88	5	P 313	3·13	4·30	5·87	0·75	2·29	11·24	1·26	14·83	6·42	5·56	90·8
13·75	7	N 69	1·83	5·42	5·06	1·53	3·37	11·89	1·62	17·45	7·32	6·17	100·7
15·20	7	N 50	1·54	4·77	4·55	1·08	2·61	10·81	1·45	15·55	6·25	5·40	88·2
6·57	7	E 665	1·40	2·44	4·24	0·55	2·78	8·51	3·64	12·08	5·99	4·62	75·5
Mean			1·69	4·39	5·99	1·87	2·72	12·37	3·31	14·90	7·90	6·12	100·0
Standard error			0·26	0·33	0·44	0·37	0·45	1·07	0·45	1·05	0·94	0·28	4·5
Significant difference			1·39 (P=·001)	0·96 (P=·05)	1·30 (P=·05)	1·08 (P=·05)	— —	3·14 (P=·05)	1·34 (P=·05)	3·09 (P=·05)	2·78 (P=·05)	0·81 (P=·05)	13·2 —

*Using actual out-turn.

Latin Square IV.—Planted 1939—Single Stem

Summary of Results for 1942-1950

Parent		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 9 years 1942-1950	
Mean Yield	No. of years recorded											Cwt.	Percentage
11·23	7	N 81	0·94	1·56	2·78	0·01	1·28	6·60	1·29	9·08	7·28	3·42	81·3
16·83	7	N 39	0·05	0·61	1·81	0·09	0·62	6·52	2·79	9·65	6·37	3·17	75·3
11·44	8	L 1	0·75	1·65	3·53	0·12	1·59	10·27	1·52	11·28	6·44	4·13	98·0
15·07	4	H 1	0·81	3·78	6·23	2·16	0·88	13·41	6·71	10·39	10·94	6·09	144·6
13·88	7	N 197	0·55	2·19	3·37	0·12	2·61	10·51	2·70	13·30	9·20	4·95	117·6
18·38	7	R 3	0·98	2·16	2·39	0·04	1·34	7·35	1·11	10·51	5·63	3·50	83·1
Mean			0·68	1·91	3·35	0·42	1·39	9·11	2·69	10·70	7·64	4·21	100·0
Standard error			0·08	0·17	0·25	—	0·26	0·71	0·62	0·91	0·76	0·25	5·8
Significant difference			0·44 (P=·001)	0·50 (P=·05)	0·74 (P=·05)	—	0·77 (P=·05)	2·10 (P=·05)	1·81 (P=·05)	2·69 (P=·05)	2·24 (P=·05)	0·72 (P=·05)	17·2 —

*Using actual out-turn.

Randomized Block I.—Planted April, 1939—Single Stem

Summary of Results for 1942-1950

Parent													
Mean Yield	No. of years recorded	Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 9 years 1942–1950	
												Cwt.	Percentage
11·71	7	R 11	0·83	Crop failed	Crop failed	1·95	1·17	9·65	2·07	16·20	5·37	4·29	86·3
14·02	7	R 2	0·65			1·68	1·32	9·51	3·09	16·80	6·98	4·59	92·4
14·49	4	H 61	0·72			5·94	1·21	13·93	8·99	16·62	7·77	6·32	127·2
Unrecorded		R.R.H.–vigorous	0·87			4·10	1·74	14·27	5·90	15·31	9·39	5·93	119·3
24·22	7	R 13	0·82			1·86	1·34	11·71	4·33	15·71	8·71	5·14	103·4
15·04	4	H 133	0·91			1·87	1·32	11·49	3·76	17·30	8·28	5·20	104·6
10·81	6	J 104	0·80			1·51	1·44	10·38	4·00	16·66	6·13	4·74	95·4
12·13	7	N 106	0·55			1·36	1·24	9·42	3·38	15·54	6·50	4·36	87·7
14·55	7	N 5	0·46			1·47	0·70	7·81	5·49	11·68	9·37	4·19	84·3
Mean			0·74			2·42	1·27	10·90	4·56	15·76	7·61	4·97	100·0
Standard error			0·12			0·41	0·21	0·71	0·78	0·98	0·84	0·17	3·4
Significant difference			0·21 (P=·2)			1·18 (P=·05)	—	2·03 (P=·05)	2·24 (P=·05)	2·80 (P=·05)	2·40 (P=·05)	0·48 (P·=05)	9·7

*Using actual out-turn.

Randomized Block II.—Planted April, 1939—Single Stem

Summary of Results for 1942-1950

Parent		Selection	1942	1943	1944	1945	1946	1947	*1948	*1949	*1950	Mean of 9 years 1942-1950	
Mean Yield	No. of years recorded											Cwt.	Percentage
13·58	7	N 100	1·27	Crop failed	Crop failed	0·55	Crop failed	10·11	1·50	13·46	6·22	4·08	102·5
13·59	7	N 217	1·58			0·59		9·38	1·74	13·76	8·03	4·22	106·0
13·93	7	R 1	1·13			0·48		9·15	2·11	12·99	6·73	4·03	101·3
12·63	7	N 229	0·89			0·35		7·79	1·51	14·37	7·23	3·94	99·0
15·19	7	N 34	1·24			0·45		9·33	1·54	12·22	5·99	3·70	93·0
7·69	7	E 325	0·52			0·63		6·87	4·27	11·00	7·58	3·74	94·0
12·76	7	N 182	0·83			0·62		6·88	4·49	11·65	8·79	3·96	99·5
14·08	7	N 215	1·03			0·49		8·06	2·44	11·90	6·88	3·76	94·5
12·41	6	J 49	1·37			0·64		10·26	1·63	16·20	5·80	4·43	111·3
Mean			1·10			0·53		8·64	2·36	13·06	7·03	3·98	100·0
Standard error			0·17			—		0·77	0·54	0·86	0·87	0·21	5·3
Significant difference (P=·05)			0·53			—		2·22	1·53	2·47	—	—	—

*Using actual out-turn.

Records of Individual Trees within the Seedling Progeny of Various Mother Trees in Experiment II

Tree No.	1946	1947	1948	1949	1950	Mean of 5 years 1946-50
F. 502/1	11·54	19·01	3·61	20·55	1·50	11·24
F. 502/2	13·66	14·93	0·07	14·73	9·08	10·61
F. 502/3	15·70	8·06	15·69	13·86	21·61	14·98
F. 839/1	9·76	16·80	1·07	23·02	6·58	11·45
F. 839/2	7·47	18·16	7·71	9·67	13·49	11·30
F. 839/3	13·15	16·38	5·44	27·39	11·88	14·85
F. 839/4	2·21	10·27	2·45	20·48	3·32	7·75
F. 839/5	13·41	9·84	3·21	16·48	7·85	10·16
F. 839/6	1·61	13·66	5·12	14·81	16·80	10·40
F. 840/1	2·80	11·96	4·51	20·23	6·68	9·24
F. 840/2	4·07	10·27	7·79	23·45	6·28	10·37
F. 840/3	6·87	34·54	0·77	19·85	9·10	14·23
F. 840/4	7·64	27·32	2·35	26·14	7·74	14·24
F. 840/5	12·81	13·32	2·58	23·76	1·17	10·73
F. 840/6	3·22	20·11	6·72	15·31	4·85	10·04
H. 1/1	6·62	25·03	7·00	27·67	6·95	14·65
H. 1/2	10·52	18·92	3·42	28·05	4·96	13·17
H. 1/3	1·78	29·70	4·09	20·52	21·44	15·51
P. 280/1	12·56	16·89	6·17	11·72	8·73	11·21
P. 280/2	9·93	9·76	13·32	5·58	6·17	8·95
P. 280/3	5·26	7·13	0·80	18·45	2·02	8·85
P. 280/4	6·11	10·35	2·80	18·04	3·52	8·16
P. 280/5	6·96	15·78	1·67	13·53	4·66	8·52
P. 280/6	6·96	16·29	0·58	17·13	3·80	8·95
P. 313/1	11·29	11·46	10·99	11·03	19·94	12·94
P. 313/2	5·52	20·96	4·16	20·07	4·76	11·09
P. 313/3	8·40	20·28	5·73	13·95	10·16	11·70
P. 313/4	3·65	15·44	0·39	19·68	10·12	9·86
P. 313/5	4·33	13·24	1·59	17·04	5·13	8·27
P. 313/6	11·23	15·86	1·18	17·11	4·51	9·98

RECORDS OF INDIVIDUAL TREES WITHIN THE SEEDLING PROGENY OF VARIOUS MOTHER TREES IN EXPERIMENT II—*contd.*

Tree No.	1948	1949	1950	Mean of 3 years 1948-1950
H. 61/65	8·02	16·26	4·84	9·71
H. 61/66	9·93	10·96	5·70	8·86
H. 61/67	18·79	7·92	5·30	10·67
H. 61/68	16·79	18·67	17·97	17·81
H. 61/69	14·71	9·45	13·81	12·66
H. 61/70	10·84	11·30	5·02	9·05
H. 61/71	30·33	7·45	32·17	23·31
H. 61/72	6·52	14·98	1·25	7·58
H. 61/73	11·33	9·08	6·47	8·96
H. 61/74	14·60	12·79	15·57	14·32
H. 61/75	19·56	12·36	25·62	19·18
H. 61/76	10·87	15·92	7·80	11·53
H. 61/77	18·08	11·55	5·03	11·55
H. 61/78	21·49	6·93	12·76	13·73
H. 61/79	9·33	20·48	16·05	15·29
H. 61/80	31·61	9·20	36·91	25·91
H. 61/81	20·18	10·99	14·60	15·25
H. 61/82	2·07	27·47	6·21	11·92
H. 61/83	3·81	30·93	5·14	13·29
H. 61/84	3·18	13·50	6·82	7·84
H. 61/85	5·61	5·73	12·22	7·85
H. 61/86	1·85	17·30	8·57	9·24
H. 61/87	4·71	17·53	10·05	10·76
H. 61/88	14·99	9·12	20·78	13·76
H. 61/89	8·32	28·44	1·86	12·87
H. 61/90	2·72	27·89	2·71	11·10
H. 61/91	5·08	34·52	4·84	14·81
H. 61/92	3·01	34·10	3·88	13·67
H. 61/93	4·16	32·11	8·39	14·89
H. 61/94	3·90	18·78	6·28	9·65
H. 61/95	1·88	7·08	8·89	5·98
H. 61/96	8·24	29·01	5·05	14·10

KENTS PLOT SELECTIONS—SINGLE STEM

Yields Calculated as Cwts. of Clean Coffee per Acre

Tree No.	1938 16%	1939 16%	1940 16%	1941 16%	1942 16%	1943 16%	1944 16%	1945 16%	1946 16%	1947 16%	1948 Actual	1949 Actual	1950 16%	Mean of 13 years 1938–50
KP. 146	25·14	15·36	31·23	7·98	12·90	12·05	17·06	3·82	1·70	11·63	15·31	2·72	2·89	12·29
KP. 147	28·17	3·75	8·23	11·29	1·53	10·78	7·72	12·90	T	6·45	1·26	7·14	4·50	7·98
KP. 151	8·60	12·11	7·38	8·06	1·36	3·73	12·30	7·38	4·92	8·99	9·03	8·83	4·33	7·46
KP. 154	12·71	17·74	9·33	13·75	0·59	12·30	2·38	11·46	1·10	22·15	30·56	3·78	23·59	12·42
KP. 162	10·95	24·66	20·03	0·68	16·12	STUMPED		0·17	0·08	2·38	4·79	0·94	4·67	6·57
KP. 163	19·43	22·34	10·95	5·77	13·58	13·24	17·06	3·31	3·82	16·80	13·56	10·67	10·69	12·40
KP. 164	9·20	12·28	6·45	5·77	5·01	5·52	17·65	3·22	8·32	25·88	31·04	13·82	31·40	13·50
KP. 176	9·33	12·33	15·95	9·08	0·59	2·21	8·74	0·17	4·33	9·08	4·66	7·22	6·36	6·93
KP. 204	8·01	14·70	7·81	16·12	1·78	10·78	10·95	10·01	14·68	18·24	3·71	22·24	0·34	10·72
KP. 214	6·79	28·17	1·27	11·63	6·36	5·86	5·60	—	0·59	5·18	—	8·89	3·39	6·44
KP. 215	3·25	30·35	8·66	6·11	5·09	13·15	28·43	6·28	14·68	21·81	4·78	26·28	5·01	13·38
KP. 218	8·26	27·05	6·87	1·78	3·82	9·08	13·24	3·31	8·49	13·24	3·91	22·82	5·43	9·79
KP. 226	7·10	27·43	6·19	10·95	—	6·70	6·79	1·78	3·56	4·67	7·86	2·94	5·94	7·07
KP. 227	11·90	22·49	16·29	17·48	0·93	12·81	12·64	T	4·92	16·55	0·29	13·42	10·27	10·77
KP. 228	13·39	25·35	7·81	8·15	0·85	8·74	7·72	5·69	6·19	13·49	1·70	16·11	5·86	9·31
KP. 231	14·37	16·86	25·20	1·02	3·31	11·37	19·26	4·58	5·60	17·23	14·29	24·16	9·33	12·81
KP. 260	7·84	12·87	8·32	11·96	2·80	10·52	12·64	11·71	9·25	22·83	1·60	33·76	2·38	11·42
KP. 261	9·57	11·54	10·01	3·39	2·72	7·21	10·78	6·28	7·81	7·64	12·26	5·71	10·52	8·11
KP. 262	11·20	14·43	12·13	11·63	0·42	20·79	7·64	15·10	10·61	16·97	1·78	8·36	9·16	10·79
KP. 263	10·98	19·46	7·01	16·38	1·02	12·13	10·86	4·07	6·79	8·49	5·94	8·79	8·49	9·26
KP. 265	13·10	14·62	9·33	9·33	3·31	19·86	13·92	7·64	18·16	14·60	20·13	9·88	23·93	13·68
KP. 266	9·90	10·95	8·57	5·43	0·34	6·45	12·47	3·48	17·74	6·53	14·78	5·13	16·97	9·13
KP. 281	8·25	12·24	7·72	0·08	0·76	11·80	15·19	0·93	4·92	2·72	6·92	20·50	17·57	8·43
KP. 285	9·42	12·30	6·87	18·75	1·53	16·46	15·10	3·14	14·51	9·50	12·39	15·50	19·77	11·94
KP. 289	8·35	11·83	10·10	13·41	0·17	13·58	13·15	3·48	7·64	21·38	2·68	19·11	3·31	9·86
KP. 352	9·05	22·01	0·68	14·17	—	11·63	6·96	4·92	6·02	11·12	18·05	10·65	20·79	10·47
KP. 362	7·41	13·10	11·12	19·52	3·73	15·78	3·90	11·29	3·65	15·02	22·79	7·01	22·49	12·06
KP. 405	6·74	14·70	2·46	2·80	2·72	12·13	15·02	5·26	10·10	17·23	28·80	18·00	24·52	12·34
KP. 406	9·62	10·93	9·33	4·16	4·33	14·93	14·09	6·87	10·78	11·37	28·49	14·80	19·09	12·21
KP. 409	9·88	13·88	5·35	9·25	3·99	18·16	10·44	8·83	11·80	10·78	19·39	11·88	23·17	12·06
KP. 412	10·01	13·69	7·64	13·58	2·80	9·84	7·89	8·57	2·63	12·81	12·61	13·39	18·67	10·32
KP. 414	10·52	11·76	7·02	6·62	1·78	10·61	6·70	6·45	7·38	8·74	24·77	7·83	23·76	10·30
KP. 423	10·49	14·15	10·95	17·99	5·94	29·62	3·99	20·03	7·55	29·02	8·16	19·35	4·84	14·01
KP. 466	8·68	12·36	6·78	14·51	0·34	15·10	8·32	9·08	1·19	14·51	12·38	22·93	10·01	10·48
KP. 512	10·27	11·15	2·89	15·78	2·12	15·78	10·36	7·04	6·62	9·25	18·16	22·08	6·36	10·60
KP. 518	5·74	14·87	2·29	13·07	3·99	10·52	10·18	6·70	1·78	8·57	8·68	2·70	14·34	7·96
KP. 532	8·51	12·51	9·50	19·52	3·14	13·92	11·96	1·10	4·75	15·53	20·47	14·38	15·44	11·59
KP. 683	18·35	12·47	6·62	15·61	2·04	16·29	4·24	14·93	0·51	9·25	11·36	15·67	12·30	10·74
KP. 685	11·56	12·83	6·11	11·96	0·85	12·98	6·53	15·95	3·39	15·02	10·63	24·47	10·18	10·96
VC. 276	7·41	14·19	14·85	6·70	8·32	8·83	9·08	4·07	9·59	7·13	16·62	2·27	13·75	9·45
VC. 363	7·64	14·91	5·60	9·50	12·47	12·73	0·59	13·32	5·35	3·31	15·96	0·08	10·95	8·65
VC. 364	6·93	14·90	8·40	8·49	13·49	6·28	0·34	14·09	6·02	7·89	21·91	1·20	6·02	8·92

T=Trace.

EXPERIMENT I—SELECTIONS

Yields Calculated as Cwts. of Clean Coffee per Acre

Tree No.	1938 16%	1939 16%	1940 16%	1941 16%	1942 16%	1943 16%	1944 16%	1945 16%	1946 16%	1947 16%	1948 Actual	1949 Actual	1950 Actual	Mean of 13 years 1938–50
11	8·99	4·56	7·81	21·30	8·23	33·35	—	41·66	0·85	26·39	10·37	10·35	—	13·37
33	4·41	13·85	3·56	22·15	6·53	25·71	—	54·05	—	29·11	43·09	11·21	14·13	17·52
55	14·09	3·79	13·92	13·24	9·84	23·59	—	38·27	2·04	49·73	1·28	25·08	2·34	15·17
71	14·17	1·64	10·61	21·55	16·63	23·93	1·19	44·89	0·51	42·26	1·15	20·04	1·17	15·36
179	13·32	2·04	6·53	21·30	2·12	37·75	3·05	39·03	—	25·03	1·47	6·88	1·29	11·52
188	15·51	—	10·27	15·02	11·96	17·14	1·27	44·21	0·59	45·06	5·71	24·94	0·88	14·81
197	13·72	1·36	10·86	14·43	7·21	21·64	8·74	50·26	0·59	27·24	20·80	13·43	3·17	14·88
200	13·88	0·08	9·25	13·41	12·98	26·98	—	45·40	—	38·36	3·39	24·22	0·82	14·52
255	13·85	—	10·52	19·86	3·05	19·77	—	49·90	—	41·24	4·14	29·25	2·52	14·93
339	16·97	0·17	13·24	7·81	11·96	27·83	—	42·85	1·95	34·54	17·35	22·38	2·17	15·32
448	15·24	1·10	14·60	10·10	5·18	26·48	—	46·16	6·70	46·08	1·65	31·55	T	15·76

T=Trace.

Experiment III.—Clones v Seedlings—Planted 1938

This experiment was originally designed to compare clones (rooted cuttings) with seedlings of the same parent, both by themselves and as root-stocks grafted with scions from another single mother-tree. The trees are pruned on the single stem system and the area is lightly shaded with *Albizzia maranguensis*. Although planted in 1938 (as a 4x4 latin square), difficulties regarding the technique of grafting in the field were experienced. The advent of the war, and consequent shortage of staff, aggravated the position, and even now there are a number of missing trees. In an endeavour to obtain further evidence regarding the respective merits of rooted cuttings and seedlings of the same parents (cf. Experiment III A below), it was decided to commence recording the yields of this experiment in 1948. Ten mother trees are represented. Due allowance has been made in the analysis for the missing trees. The yields for the years 1948 to 1950 are given below :—

	1948	1949	1950	Mean of 3 years 1948-50
Clones	8·83	15·75	9·09	11·38
Seedlings	12·16	16·12	12·80	13·56
Mean	10·50	15·94	10·94	12·47
Standard Error	1·80	1·87	1·63	0·43
Significant Difference (P=·05) ...	—	—	—	1·95

Seedlings have given a significantly higher yield than clones in this experiment.

Experiment IIIA.—Clones v Seedlings—Planted 1942

This is designed to give a straight comparison between clones (rooted cuttings) and seedling progeny of the same mother-trees ; the experiment is laid out as randomized blocks repeatde ten times ; the trees are pruned on the single stem system. Shade is afforded by *Albizzia stipulata* and *Maesopsis eminii*, with *Albizzia maranguensis* as the permanent shade tree. As in Experiment III there are a number of missing trees for which allowance has been made in the analysis. This correction is for differences in numbers only. The records of this experiment were kept by plots up to 1949. Individual tree yields were recorded in 1950. The yields for the period 1945-50 are shown below :—

	1945	1946	1947	1948	1949	1950	Mean of 6 years 1945-50
							Cwt.
Clones	3·17	Crop failed	5·45	8·48	10·91	13·11	6·78
Seedlings	2·06		4·66	9·44	9·43	14·69	6·76
Mean	2·62		5·06	8·96	10·17	13·90	6·77
Standard Error	0·23		0·17	0·46	0·53	0·90	0·24
Significant Difference (P=·05) ...	0·75		0·55	—	—	—	—

For the 6-year period there is no significant difference in yield.

Experiment V.—Mulch, Compost and Nitrogen—Planted 1940

This is a partially confounded 3x3x3 factorial experiment designed to determine the effects on yield of mulch, compost, and Sulphate of Ammonia at three quantity levels separately and in all combinations. The material used for mulching is dried elephant grass. The area is unshaded ; the trees, which are unselected clonal material, are pruned on the single stem system.

Treatments (per tree) :

Mulch :
- M0 = Nil.
- M1 = 40 lb. dried Elephant Grass.
- M2 = 80 lb. dried Elephant Grass.

Compost :
- C0 = Nil.
- C1 = 1 debe (petrol tin) compost.
- C2 = 2 debes (petrol tin) compost.

Nitrogen :

	1940-42	1943-45	1946-50
N0	Nil	Nil	Nil
N1	= 1 oz. Sulphate of Ammonia.	2 ozs. Sulphate of Ammonia.	3 ozs. Sulphate of Ammonia.
N2	= 2 ozs. Sulphate of Ammonia.	4 ozs. Sulphate of Ammonia.	6 ozs. Sulphate of Ammonia.

The mulch is applied after the long rains ; the compost is applied just before the long rains and is lightly forked in ; the Sulphate of Ammonia is applied after approximately 15 inches of rain have fallen.

The annual yields and also the summary for the years 1942-50 are given below.

EXPERIMENT V

Summary of yields 1942—50

Mulch Compost Nitrogen	1942	1943	1944	1945	1946	1947	1948	1949	1950
0 0 0	1·26	0·29	0·45	11·23	Crop failed	7·39	22·75	7·14	18·04
0 0 1	1·28	0·55	0·58	11·49		9·27	25·17	8·57	21·22
0 0 2	1·00	0·36	0·92	13·65		11·54	21·57	13·39	14·85
0 1 0	1·46	0·54	0·95	17·18		12·98	22·39	11·32	18·10
0 1 1	1·42	0·51	1·17	14·21		15·14	17·79	15·15	16·02
0 1 2	1·35	0·46	0·65	10·39		11·48	19·06	15·34	16·83
0 2 0	1·71	0·68	1·03	17·61		10·58	24·69	11·62	18·37
0 2 1	1·32	0·37	1·16	14·16		12·95	20·09	13·71	17·32
0 2 2	0·42	0·36	0·64	13·29		11·92	17·09	16·02	16·55
1 0 0	1·85	0·49	0·88	15·27		8·89	24·76	9·61	14·12
1 0 1	1·51	0·59	1·43	14·32		11·30	21·01	11·90	16·71
1 0 2	1·48	0·39	1·20	12·83		10·42	17·30	12·67	14·67
1 1 0	2·31	0·60	0·97	15·84		12·95	20·41	16·09	16·25
1 1 1	2·18	0·78	0·82	13·15		10·00	20·83	12·13	16·47
1 1 2	1·42	0·46	1·43	16·17		13·13	22·44	14·81	14·99
1 2 0	1·99	0·64	1·49	13·53		15·86	17·45	14·65	18·22
1 2 1	1·52	0·47	0·70	13·01		15·14	16·49	15·15	17·49
1 2 2	1·65	0·57	1·04	12·18		10·63	22·38	11·91	18·58
2 0 0	1·86	0·52	1·01	14·09		14·51	20·91	14·42	14·04
2 0 1	1·65	0·56	1·28	13·52		12·22	20·17	14·11	12·86
2 0 2	1·38	0·31	0·87	9·47		9·70	19·14	14·18	12·31
2 1 0	1·24	0·51	1·15	13·34		10·48	20·81	14·16	15·02
2 1 1	1·64	0·31	0·76	14·41		14·09	17·81	13·14	12·29
2 1 2	1·56	0·17	0·92	15·30		12·80	17·41	14·63	15·71
2 2 0	1·38	0·54	1·24	14·06		11·96	18·82	13·61	18·18
2 2 1	1·66	0·61	1·07	10·01		10·81	22·81	10·92	16·05
2 2 2	1·67	0·53	1·04	12·96		13·30	16·93	14·30	14·56

Mean Yield of 9 Years 1942—50

	N0			N1			N2		
	C0	C1	C2	C0	C1	C2	C0	C1	C2
M0	7·617	9·434	9·586	8·681	9·044	9·003	8·586	8·349	8·521
M1	8·431	9·489	9·314	8·752	8·482	8·886	7·929	9·427	8·722
M2	9·040	8·523	8·862	8·483	8·271	8·224	7·438	8·766	8·363

Standard Error $\pm$ 0·411.

From the table above the effects of the simple treatments are:—

M0	7·617	...	C0	7·617	...	N0	7·617
M1	8·431	...	C1	9·434	...	N1	8·681
M2	9·040	...	C2	9·586	...	N2	8·586

Compost only has resulted in a significant increase in yield over the period of the experiment.

Experiment XV.—Irrigation and Mulch—Planted 1940

This is a complex confounded factorial experiment laid out as an 8 x 8 quasi-latin square. It is designed to investigate the effects of irrigation and mulch, both separately and in combination, on coffee culture. The material used for mulching is dried banana trash. The experiment is planted with four different clones, from unselected mother-trees, and the behaviour of these clones is also recorded. They are pruned on the single stem system. The area is unshaded.

Treatments:

Irrigation:
0 = Nil.
1 = Made up to 2 inches effective rainfall monthly.
2 = Made up to 4 inches effective rainfall monthly.
3 = Made up to 2 inches effective rainfall fortnightly.

Mulch:
0 = Nil.
1 = Banana trash 40 lb. per tree at end of long rains.
2 = Banana trash 80 lb. per tree at end of long rains.
3 = Banana trash 40 lb. per tree at end of both long and short rains.

Clone:
1 = KIL 50
2 = KIL 98
3 = KIL 48
4 = KIL 10

The annual yields for the various treatments are given below together with the summary for the years 1942-50.

Annual Yields Expressed as Cwts. Clean Coffee per Acre

Irrigation	Mulch	1942	1943	1944	1945	1946	1947	1948	1949	1950
0	0	0·38	2·22	0·05	2·61	0·30	2·19	15·47	4·26	11·67
0	1	1·42	5·76	1·72	1·97	1·21	8·31	20·81	8·88	14·39
0	2	1·61	6·11	1·88	1·21	0·44	8·28	21·14	7·93	14·86
0	3	1·35	5·53	2·67	1·10	0·70	7·48	17·29	9·48	13·76
1	0	0·66	4·95	2·55	1·54	3·42	12·43	12·33	15·00	7·33
1	1	1·80	8·29	2·99	0·86	4·33	17·76	16·63	18·79	8·31
1	2	2·03	9·32	2·87	1·80	1·95	14·65	16·97	14·22	7·87
1	3	1·76	7·97	3·24	1·34	4·20	16·69	15·75	15·20	9·85
2	0	0·86	6·46	2·94	1·56	3·75	12·54	11·06	18·05	4·92
2	1	1·72	9·57	3·26	1·04	3·68	15·10	14·29	18·10	6·84
2	2	2·43	7·94	2·33	0·97	3·00	15·10	16·25	16·17	6·61
2	3	1·70	6·87	3·46	1·17	3·14	15·21	17·32	13·76	7·92
3	0	1·10	5·11	2·85	1·07	1·92	12·55	8·39	16·04	5·58
3	1	1·96	7·44	2·76	0·20	3·85	17·97	14·25	15·05	10·58
3	2	2·22	7·02	4·27	0·54	3·42	18·08	15·37	16·12	9·20
3	3	1·59	5·75	4·08	0·70	2·96	17·40	15·39	12·87	8·78

Mean Yield of 9 Years, 1942—1950

IRRIGATION

Mulch	0 Cwt. per acre	0 %	1 Cwt. per acre	1 %	2 Cwt. per acre	2 %	3 Cwt. per acre	3 %	Mean (Mulch) Cwt. per acre	Mean (Mulch) %
0	4·269	57·7	6·693	90·4	6·962	94·1	6·118	82·7	6·011	81·2
1	7·164	96·8	8·858	119·7	8·154	110·2	8·232	111·2	8·102	109·5
2	7·046	95·2	7·968	107·7	7·867	106·3	8·469	114·4	7·838	105·9
3	6·598	89·2	8·440	114·0	7·853	106·1	7·726	104·4	7·654	103·4
Mean (Irrigation)	6·269	84·7	7·990	108·0	7·709	104·2	7·636	103·2	7·401	100·0

		Cwt.		%
Standard Error for Marginal Means	±	0·195	...	2·6
Significant Difference for Marginal Means	±	0·577	...	7·8
Standard Error of Entries in Body of Table	±	0·390	...	5·3

The mulch and irrigation treatments have all been effective. No advantage has accrued from the heavier applications.

Experiment XIV A.—Mulch—Planted 1940

Laid out as a 5 x 5 latin square, with split plots to show the effects of sulphate of ammonia' this experiment is designed to determine the effects on yield of banana trash, guinea grass (*Panicum maximum*) and elephant grass (*Pennisetum purpureum*) applied as mulches, compost made from an equivalent amount of elephant grass, and clean cultivation. The trees are clonal material from unselected mother trees and are pruned on the single stem system. The area is sparsely shaded with *Albizzia maranguensis* as the permanent shade tree.

Treatments:

A—Control—Routine clean cultivation.
B—Banana trash (80 lb. per tree).
C—Elephant Grass (80 lb. per tree).
D—Guinea Grass (80 lb. per tree).
E—Compost (1 debe per tree).

Sulphate of Ammonia (Sub-plots):
1941-42—2 ozs. per tree.
1943-45—4 ozs. per tree.
1946-50—8 ozs. per tree.

As in Experiment V, the mulches (dried material) are applied after the long rains; the compost is applied just before the long rains and is lightly forked in; the Sulphate of Ammonia is applied after approximately fifteen inches of rain has fallen.

The yearly results and the mean for the nine-year period 1942-1950 are given below.

EXPERIMENT XIVA

Summary of Results 1942-50

N1=Plots to which Sulphate of Ammonia applied.

N0=Plots to which no Sulphate of Ammonia applied.

	1942		1943		*1944		*1945		*1946		*1947		*1948		*1949		*1950		Summary of 9 years 1942-1950			
	Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots		Sub-plots			
	N1	N0	N1	N0	N1	N0	N1	N0	N1	N0	N1	NO	N1	N0	N1	N0	N1	N0	N1	Per-cent-ages	N0	Per-cent-ages
Treatments																						
A. Nil	1·80	1·66	4·68	5·04	0·04	0·07	11·82	9·43	0·06	0·23	11·50	14·35	5·92	6·38	12·99	16·58	5·39	5·48	6·10	88·5	6·55	95·1
B. Banana Mulch (80 lb. per tree)	1·87	2·31	4·09	4·82	0·36	0·84	11·90	10·77	0·36	0·90	13·30	15·97	8·33	8·02	15·93	17·83	6·30	7·27	6·92	100·4	7·59	110·2
C. Elephant Grass (80 lb. per tree)	1·73	1·80	4·55	4·67	0·23	0·50	11·50	12·40	0·13	0·19	14·76	13·64	5·78	7·49	14·65	21·39	5·32	5·61	6·49	94·2	7·48	108·6
D. Guinea Grass (80 lb. per tree)	1·90	2·21	4·18	5·87	0·35	1·53	11·25	8·40	0·35	0·83	16·89	15·14	6·70	7·73	16·84	16·34	4·43	5·89	6·95	100·9	7·04	102·2
E. Compost (1 debe per tree)	1·22	1·29	4·23	5·63	0·06	0·10	10·75	10·52	0·03	0·44	17·03	13·18	4·73	6·75	16·60	15·40	9·68	7·48	7·12	103·3	6·69	97·1
Mean	1·70	1·85	4·34	5·21	0·25	0·61	11·44	10·30	0·19	0·44	14·70	14·46	6·49	7·27	15·40	17·51	6·22	6·35	6·72	97·5	7·07	102·6
Standard Error	0·009	0·009	0·13	0·13	0·329	0·329	0·409	0·409	0·070	0·070	1·229	1·229	0·740	0·740	1·32	1·32	0·82	0·82	0·31	4·5	0·31	4·5
Significant Difference (P=·05).	–	–	0·36	0·36	–	–	1·208	1·208	0·207	0·207	3·627	3·627	–	–	3·88	3·88	–	–	–	–	–	–

*Results worked out on actual out-turn basis. Remainder on 16%.

Over the whole period of the experiment no significant differences in yield have resulted from the application of Sulphate of Ammonia, mulches or compost. Except when applied alone or with compost, the application of Sulphate of Ammonia has tended to depress yields.

Experiment IX.—Cultivation—Planted 1934

Laid out as a 5 x 5 latin square, the object of this experiment is to determine the effect of the various methods of cultivation. The experiment was planted with the seedling progeny of a planter's selection from a district remote from the Kilimanjaro-Meru coffee growing areas. It was originally grown on the single stem system without shade, but in 1944 it was converted to multiple stem. It is sited on sloping land, which had been previously terraced, with a western aspect.

Treatments:

A. Forked jembe (forked hoe).
B. Jembe (West Indian hoe).
C. No cultivation.
D. Envelope forking.
E. Trenching.

THE ANNUAL YIELDS TOGETHER WITH THE MEAN FOR 13 YEARS, 1938—50, ARE GIVEN BELOW.

Treatment :	*1938	*1939	*1940	*1941	*1942	*1943	1944	*1945	1946	†1947	†1948	†1949	†1950	Mean of 13 years 1938—1950	
														Cwt.	Percentage
A. Forked hoe (forked jembe)	5·77	0·27	2·60	9·23	1·86	7·86	Converted to multiple stem	6·28	Crop failed	24·17	1·52	17·09	9·45	6·56	113·1
B. West Indian hoe (jembe)	5·79	0·48	2·74	8·23	2·43	7·73		6·60		22·14	0·68	14·99	6·40	5·95	102·6
C. No Cultivation	5·61	0·41	2·20	9·16	1·90	7·17		5·79		17·79	1·14	13·45	6·75	5·43	93·6
D. Envelope forked	4·55	0·35	1·67	7·32	1·63	5·26		5·29		21·47	1·28	17·86	7·21	5·72	98·6
E. Trenching	4·81	0·45	2·11	9·33	1·38	5·80		5·24		19·49	0·12	16·10	5·75	5·35	92·2
Mean	5·31	0·39	2·26	8·66	1·84	6·76		5·84		21·01	0·95	15·90	7·11	5·80	100·0
Standard Error	–	–	0·34	0·33	0·10	0·12		0·62		1·689	0·268	0·716	0·77	0·84	5·9
Significant Difference (P=·05).	–	–	1·05	–	–	–		–		–	0·825	2·21	2·36	–	–

*16% Out-turn. †Actual Out-turn.

Over the period of 13 years there is no significant difference between the yields of the plots under the various treatments.

Experiment XIII.—Method of Pruning—Planted December, 1935

This experiment is laid out as 3 x 3 Latin Square, repeated three times in different parts of the Station. It is designed to compare three systems of pruning arabica coffee. Two of the replicates are lightly shaded with *Albizzia maranguensis*; the third is unshaded. The experiment is planted with seedling material.

Treatments:

S = Single Stem.
M/3 = Multiple Stem—3 Suckers.
M/A = Multiple Stem Agobiada—3 Suckers.

The yearly results, together with the summary, for the period 1938-50 are shown on page 38.

EXPERIMENT XIII

Summary of Results—1938-50

Treatments :	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	Mean of 13 years 1938-50	
														Cwt.	Per-cent-age
Single stem	Fly crop	1·982	2·996	7·290	3·991	5·318	5·319	9·589	1·04	20·492	9·318	15·052	12·362	7·13	86·4
Multiple stem, 3 suckers ...		2·348	11·928	12·962	12·034	17·238	5·677	7·079	2·30	29·578	5·056	12·701	13·446	10·20	123·6
Agobiada, multiple stem, 3 suckers...		0·407	6·607	6·370	7·494	13·079	4·992	8·028	0·90	17·329	10·987	13·840	7·272	7·42	89·9
Mean		1·579	7·177	8·874	7·840	11·878	5·329	8·232	1·41	22·467	8·454	13·864	10·745	8·25	100·0
Standard Error		0·301	0·493	0·700	0·401	0·843	0·127	1·013	0·312	0·410	0·764	0·552	2·108	0·29	3·6
Significant difference (P = ·05).		1·043	1·707	2·422	1·389	2·918	0·440	–	1·256	1·419	2·642	–	–	1·02	12·4

For the whole period of the experiment the multiple stem system has outyielded that of the single stem system and the difference is significant at P = 0·001.

Age of Seed Experiment

Determination of the rate of deterioration of coffee seed with storage.

Sowings at monthly intervals commencing seven weeks from date of harvest.

Seed from one clone.

Results

Age in Weeks	Percentage Germinated	Time taken to Germinate* In Weeks
7	95	10·1
12	97	15·7
16	94	11·6
21	87	16·1
25	60	23·1
29	62	16·3
34	27	16·7
38	40	23·0
43	24	23·3
47	22	26·0

*Time taken to germinate was reckoned from the date of sowing to the date when the final germination figure was obtained.

There is a high positive correlation between the age of seed and the percentage ungerminated and between age of seed and the time taken to germinate.

Vegetative Propagation

The Table below summarizes the 1948-50 results:—

A	B	C	D	E	F	G
Year	Cuttings Planted	Cuttings Rooting Within 6 Months	Losses After Rooting From C	Cuttings Rooting After 6 Months	Losses After Rooting From E	Total Planted Out
1948 ...	24,163	8,806 (36·44%)	—	5,766 (23·86%)	—	—
1949 ...	13,287	8,770 (66·00%)	1,393 (15·88%)	908 (6·83%)	249 (27·42%)	8,036 (60·48%)
1950 ...	19,391	15,821 (81·59%)	1,316 (8·32%)	774 (3·99%)	98 (12·66%)	15,181 (78·29%)

The percentages in columns C, E and G are of the total cuttings planted in (B).

The percentages in column D are of the figures in column C.

The percentages in column F are of the figures in column E.

Statement Showing Grades and Classification of the 1950—51 Crop.

	Tons
Total estimated crop expressed as clean coffee	59·50
This total is made up as follows:—	
Lots 1-9 inclusive, sent to Curing Works	53·58
Floaters, sent to Curing Works	0·53
Washed seed, sent to Curing Works	0·94
Clean coffee equivalent of 4,327 lb. of seed distributed	1·55
Coffee samples, etc.	1·08
	57·68

	Tons
Buni	2·79
Maragojipe parchment...	0·46
Robusta parchment	0·07
	*3·32

*This is estimated as being equal to 1·82 tons clean coffee.

The grading and Classification of Lots 1-9 amounting to 53·58 tons of clean coffee was:—

	Grading			Classification			
	lb.		%		lb.		%
AA ...	55,804	...	46·49	1	40,126	...	33·43
A	37,556	...	31·29	2	45,197	...	37·66
PB ...	9,709	...	8·09	3	2,619	...	2·18
B	4,035	...	3·36	4	17,595	...	14·66
E	2,153	...	1·79	5	2,461	...	2·05
C	610	...	0·51	6	6,302	...	5·25
T	2,174	...	1·81	7	2,909	...	2·42
TT... ...	7,331	...	6·11	8	1,642	...	1·37
HP ...	653	...	0·54	9	1,106	...	0·92
				10... ...	68	...	0·06
	120,025				120,025		
=	53·58 Tons						

The amount obtaining Class I constituted 58·41 per cent of the total of Class I produced in the Territory in the season.

Monthly Rainfall from September 1944 to end of August 1950

(in inches)

	September 1944 to end of August 1945	September 1945 to end of August 1946	September 1946 to end of August 1947	September 1947 to end of August 1948	September 1948 to end of August 1949	September 1949 to end of August 1950
September	2·42	0·20	7·34	1·23	0·30	0·33
October ...	3·15	0·05	4·71	1·27	2·51	0·69
November	3·10	4·66	1·13	0·93	1·65	0·26
December	5·14	0·30	2·19	1·31	6·19	1·38
January ...	1·72	0·02	2·01	0·46	1·79	2·06
February	1·39	1·14	0·72	0·71	4·17	3·01
March ...	4·85	0·57	3·37	2·72	0·10	7·09
April ...	15·19	16·50	28·45	14·50	9·34	16·20
May ...	21·34	22·74	25·73	15·56	10·64	24·96
June ...	3·45	2·54	10·97	2·93	0·92	5·09
July ...	3·15	0·59	1·43	1·53	1·86	1·81
August ...	1·33	1·03	1·38	0·44	0·82	0·88
Total ... (in inches)	66·23	50·74	89·43	43·59	40·29	63·76

Rainfall for remaining months of 1950. (in inches). September 1·87. October 0·80. November 0·88. December 0·91.